Calpuff Class I

Area Analysis

for

Milton R. Young

Generating Station

May 24, 1999

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1. Overview

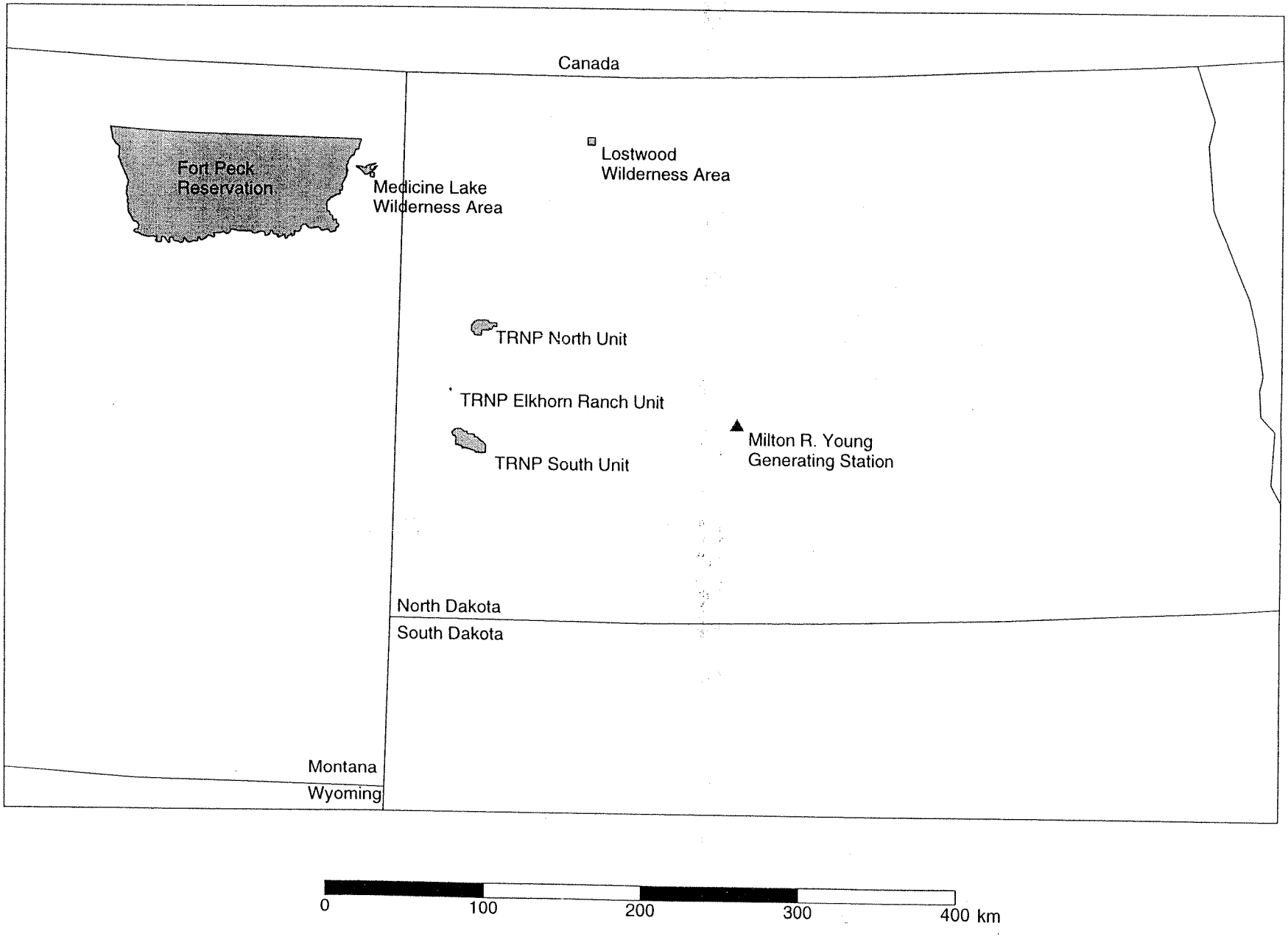
Minnkota Power Cooperative, Inc. proposes to increase energy output from Units 1 and 2 at its existing Milton R. Young generating station located near Center, North Dakota. The proposed increase will result in additional emissions of sulfur dioxide (SO_2), nitrogen oxides (NO_x), and particulate (PM_{10}) to the ambient air. The emission increases will be greater than 250 tons per year for both SO_2 and NO_x. Because the increase in production will not be associated with a physical change or change in the method of operation at the plant, however, the proposed increase does not constitute a major modification under PSD rules[1].

To implement the proposed increase in energy output, Minnkota Power Cooperative has submitted a Permit to Construct application to the North Dakota Department of health for a change in the method of operation at the Milton R. Young station. The application is for a permit revision which would allow Minnkota to operate the two units at a higher load level than was previously stated as the maximum design capacity of the units. The maximum rated heat input for Unit 1 would increase from 2,500 x 10^6 Btu/hr to 3,200 x 10^6 Btu/hr, a 28% increase. The maximum rated heat input for Unit 2 would increase from 4,696 x 10^6 Btu/hr to 6,300 x 10^6 Btu/hr, a 34% increase. The actual emission rates (peak 3-hr and 24-hr) would increase the same percentage.

An air quality modeling analysis was conducted to determine the impact of proposed emission increases at the Milton R. Young (MRY) station on ambient air quality. Though the proposed production increase does not constitute a PSD major modification, the North Dakota State/EPA Performance Partnership Agreement[2] stipulates tracking of PSD increment for minor sources. Therefore, the modeling analysis addressed PSD increments as well as ambient air quality standards. Minnkota Power Cooperative, Inc. provided the modeling analysis for ambient air quality standards and PSD Class II increments, which is currently under review. This report focuses on the Class I area modeling analysis conducted by the North Dakota Department of Health (NDDH).

Class I areas in the vicinity of Milton R. Young generating station are depicted in Figure 1-1. These include the Theodore Roosevelt National Park (TRNP) and Lostwood Wilderness Area in North Dakota, and the Medicine Lake Wilderness Area and Fort Peck Indian Reservation in Montana. The TRNP is separated into three physically distinct units: North Unit, South Unit, and Elkhorn Ranch Unit. Based on previous experience with modeling Class I area impacts, NDDH policy[3] stipulates that all significant (SO_2,

Figure 1-1: Class I Areas in Vicinity of MRY Generating Station



NO_x, PM_{10}) sources within 250 km of the Class I area should be modeled. Accordingly, Milton R. Young impact on TRNP and Lostwood was modeled. Because Medicine Lake and Fort Peck lie just beyond 250 km from Milton R. Young, impact on those Class I areas was also addressed, but with limited receptor resolution.

Consistent with current Interagency Workgroup for Air Quality Modeling (IWAQM) guidance[4], the Calpuff long-range modeling system[5,6] was used to evaluate Milton R. Young impact on Class I areas. This included use of the Calmet meteorological model, the Calpuff dispersion model, and the Calpost postprocessing program. To the extent possible, the NDDH used the supporting software programs provided by Earth Tech (Earth Tech, Inc., Concord, MA), the primary model developer, for preparation of input data and interpretation of model results. However, modification of some of Earth Tech's programs, and the preparation of numerous additional programs, was required to complete these tasks.

The Calpuff modeling analysis revealed significant Milton R. Young contributions to numerous exceedances of Class I increments. Therefore, the analysis was extended to include preliminary assessment of Milton R. Young emission increases on Class I area visibility (light extinction).

During the course of NDDH work on implementation of Calpuff, and subsequent application for the Milton R. Young station modification, the modeling system has undergone revisions by Earth Tech. With the Earth Tech convention, model version is denoted by both a version number and a level number, i.e., version number change implying more significant revisions than level number change. The NDDH found it necessary to use the most recent version/level for the visibility analysis, while earlier levels had been used for the Class I increment analysis. Model versions used by NDDH are summarized below.

Class I Increment	Calmet Ver. 5.0, Lvl. 970825
	Calpuff Ver. 5.0, Lvl. 971107
	Calpost Ver. 5.0, Lvl. 971015
Visibility	Calmet Ver. 5.0, Lvl. 970825
	Calpuff Ver. 5.0, Lvl. 981116
	Calpost Ver. 5.0, Lvl. 981116

It is not expected that the use of more recent levels for the Class I increment analysis would have produced any significant difference in results.

This report is organized into six additional sections and seven appendices. Section 2 describes the preparation and processing of meteorological data using Calmet and supporting software. Testing and evaluation of the NDDH Calpuff implementation is discussed in Section 3. The Calpuff analysis for MRY station Class I increment consumption is described in Section 4, and the analysis for MRY station impact on visibility is discussed in Section 5. A report summary is provided in Section 6 and references in Section 7. Appendix A documents NDDH code changes to Calmet. The NDDH report on Calpuff performance evaluation is provided as Appendix B. The NDDH Calpuff postprocessing system is documented in Appendix C. Complete results for the Calpuff Class I increment analysis are provided in Appendix D. A National Park Service transmittal regarding background light extinction and visibility modeling guidance is included as Appendix E. Appendix F documents NDDH code changes to Calpost, and Appendix G provides a description of all files included on computer media with this report.